Planning and Environmental Consultants

Non-Technical Summary

Proposed Seven Hills Wind Farm, Co. Roscommon

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1. NON-TECHNICAL SUMMARY

1.1 Introduction

This Environmental Impact Assessment Report (EIAR) has been prepared by MKO of behalf of the applicant, Energia Renewables ROI Ltd., a joint venture between Energia Renewables Ltd. and Galetech Energy Developments Ltd., who intend to apply to An Bord Pleanála for planning permission for the construction of a wind energy development in Cuilleenoolagh and adjacent townlands in Co. Roscommon. The townlands within which the Proposed Development is located are listed in Table 1-1.

Table 1-1 Townlands within which the Proposed Development is located

Townlands within which the Proposed Development is located:	
Turrock	Cronin
Gortaphuill	Glenrevagh
Tullyneeny	Bredagh
Cuilleenirwan	Commeen
Cuilleenoolagh	Curry
Milltown	Tobermacloughlin
Skeavally	Boleyduff
Clooncaltry	Feacle
Cam	Tawnagh
Cornageeha	Pollalaher
Brideswell	Ballymullavill
Knocknanool	Cloonakille
Rooskagh	Monksland
Bellanamullia	

This EIAR complies with the EIA Directive 2011/92/EU as amended by Directive 2014/52/EU. The Environmental Impact Assessment (EIA) of the proposed project will be undertaken by An Bord Pleanála, as the competent authority.

Applicant

Energia Renewables Ltd. is a subsidiary company of Energia Group, with offices in Dublin, Belfast, Antrim and Omagh, with extensive experience in the design, construction and operation of wind energy developments throughout Ireland. As a leading, long term energy provider and infrastructure investor Energia Group currently supplies approximately 20% of the island of Ireland's total electricity requirements and is responsible for approximately 25% of wind power capacity installed on the island.

Their growing renewable energy portfolio consists of 15 onshore wind farms, which generate over 300MW of green electricity, and an additional 900MW through Power Purchase Agreements, or PPAs.

Galetech Energy Developments Ltd. is an Irish owned company, based in County Cavan, with a focus on the development of renewable energy projects in Ireland and worldwide. Over 50MW has already been developed with a further 350MW in various stages of development in Ireland and over 500MW in the development pipeline in Europe and Africa.

The pre-application consultation with An Bord Pleanála was undertaken with Energia Renewables as the prospective applicant. As the project progressed, it is noted that the planning application will be submitted to An Bord Pleanála by Energia Renewables ROI Ltd.

Brief Description of the Proposed Development

The Proposed Development comprises the construction of 20 No. wind turbines and all associated works. The proposed turbines will have a blade tip height of 180 metres. The applicant is seeking a ten-year planning permission. The full description of the Proposed Development, as per the public planning notices, is as follows:

1. *20 no. wind turbines with an overall ground to blade tip height of 180 metres, a rotor dimeter of 162m and a hub height of 99m, associated foundations, hard-standing areas*
2. *15 no. spoil storage areas at hardstands of turbines no. 1, 2, 3, 4, 5, 6 and 7 (in the townlands of Turrock, Gortaphuill, Cronin, and Tullyneeny) and turbines no. 8, 10, 11, 13, 14, 17, 19 and 20 (in the townlands of Milltown, Cuilleenoolagh, Cloonacaltry, Feacle and Tawnagh)*
3. *Provision of 1 no. permanent meteorological mast with a maximum height of 100 metres for a period of 30 years from the date of commissioning of the entire wind farm*
4. *Provision of 1 no. 110kV onsite substation in the townland of Cam, along with associated control buildings, MV switchgear building, associated electrical plant, associated security fencing, and equipment and wastewater holding tank*
5. *All underground electrical and communication cabling connecting the proposed wind turbines to the proposed onsite substation and associated control buildings and plant*
6. *All works associated with the connection of the proposed wind farm to the national electricity grid via underground 110kV cabling from the site to the existing Athlone 110kV substation located in the townland of Monksland. Cabling will be placed within the public road corridor of the R362, R363 and L2047, or on private land*
7. *Upgrade works to the existing 110kV Athlone substation consisting of the construction of an additional dedicated bay to facilitate connection of the cable*
8. *Provision of 2 no. new site accesses north and south from the R363 and upgrade of 1 no. junction south of the R363*
9. *Provision of new access tracks/roads and upgrade of existing access tracks/roads*
10. *7 no. overburden storage areas*
11. *2 no. temporary construction compounds*
12. *Site drainage works*
13. *Operational stage site signage*
14. *All associated site development works, apparatus and signage*

This application is seeking a ten-year planning permission to construct the Proposed Development and a 30-year operational life from the date of commissioning.

Current and future wind turbine generator technology will ensure that the wind turbine model, chosen for the Proposed Development, will have an operational lifespan greater than the 30-year operational life that is being sought as part of this application.

Modern wind turbine generators typically have an output of between 4 and 6.2MW. For the purposes of this EIAR however, a turbine model with a rated output of 6 MW per turbine has been chosen to calculate the power output of the proposed 20-turbine wind farm, which would result in an estimated installed capacity of 120 MW.

Need for the Proposed Development

Ireland faces significant challenges to its efforts to meet EU targets for renewable energy by 2030 and its commitment to transition to a low carbon economy by 2050. Further detail can be found in Chapter 2, Section 2.2 of this EIAR.

The Proposed Development provides the opportunity to capture an additional part of County Roscommon's valuable renewable energy resource. If the Proposed Development were not to proceed, this opportunity would be lost, as would the opportunity to contribute to meeting Government and EU targets for the production and consumption of electricity from renewable resources and the reduction of greenhouse gas emissions.

Furthermore, the opportunity to generate local employment and investment associated with the Proposed Development would also be lost, and the local economy would continue to rely primarily on agriculture and commercial forestry as the main source of income.

In March 2019, the Government announced a renewable electricity target of 70% by 2030. The Climate Action Plan 2021 (CAP), published in November 2021, aims to increase the proportion of renewable electricity to up to 80% by 2030. This is described as being among the most critical measures in the plan. The Proposed Development is likely to be operational before 2030 and would therefore contribute to this 2030 target. More recently, the EPA reported that Ireland is set to fall far short of all of its carbon emissions reduction targets for 2030, despite climate action measures in the National Development Plan (EPA, June 2019). As such, the Proposed Development at Seven Hills is critical to helping Ireland address these challenges with the potential for the development to double the current capacity and contribute to County Roscommon's renewable energy targets, as well as addressing the country's over-dependence on imported fossil fuels.

The need for the Proposed Development is driven by the following factors:

1. *A legal commitment from Ireland to limit greenhouse gas emissions under the Kyoto protocol to reduce global warming;*
2. *A requirement to increase Ireland's national energy security as set out in the Energy White Paper;*
3. *A requirement to diversify Irelands energy sources, with a view to achievement of national renewable energy targets and an avoidance of significant fines from the EU (the EU Renewables Directive);*
4. *Provision of cost-effective power production for Ireland which would deliver local benefits; and*
5. *Increasing energy price stability in Ireland through reducing an over reliance on imported gas.*

The CAP was published on the 4th of November 2021 by the Department of Communications, Climate Action and Environment (DoCCAE). The CAP sets out an ambitious course of action over the coming years to address the impacts which climate may have on Irelands environment, society, economic and natural resources. This Plan clearly recognises that Ireland must significantly step up its commitments to tackle climate disruption. The CAP identifies the need to increase the share of electricity demand generated from renewable sources by to up to 80% where achievable and cost effective, without compromising security of electricity supply and a need for 8.2GW of onshore wind generation. Only 4.3GW is in place in Ireland as of January 2022, therefore Ireland needs to increase its installed capacity of wind generation. The CAP presents clear and unequivocal support for the provision of additional renewable energy generation and presents yet further policy support for increased wind energy.

Section 2.2 in Chapter 2 of this EIAR on Background to the Proposed Development, presents a full description of the international, national and regional renewable energy policy context for the proposed project. It addresses climate change, including Ireland's current status with regard to meeting greenhouse gas emission reduction targets.

Economic Benefits

The Proposed Development will have several significant long-term and short-term benefits for the local economy including job creation, local authority commercial rate payments and a Community Gain Funds.

The annual commercial rate payments from the Proposed Development to Roscommon County Council, will be redirected to the provision of public services within Co. Roscommon. These services include provisions such as road upkeep, fire services, environmental protection, street lighting, footpath maintenance etc. along with other community and cultural support initiatives.

It is estimated that the Proposed Development has the potential to create approximately 100 jobs during the construction, operational and maintenance phases of the Proposed Development. During construction, additional employment will be created in the region through the supply of services and materials to the development. In addition to this, there will also be income generated by local employment from the purchase of local services i.e., travel and lodgings.

Should the Proposed Development receive planning permission, there are substantial opportunities available for the local area in the form of Community Gain Funds. The applicant proposes to provide a fund of €300,000 per annum over the lifespan of the Proposed Development based on the current estimated generating capacity. This will equate to potential funding of in the region of €9 million to the local community which is a substantial contribution. The value of this fund will be directly proportional to the level of installed MWs at the site. Further details on the proposed Community Gain proposals are presented in Section 4.5 and Appendix 2-2 of this EIAR.

Purpose and Structure of this EIAR

The purpose of this EIAR is to document the current state of the environment in the vicinity of the Proposed Development site and to quantify the likely significant effects of the Proposed Development on the environment. The EIAR submitted by the applicant provides the relevant environmental information to enable the Environmental Impact Assessment (EIA) to be carried out by the competent authority, in this case An Bord Pleanála.

The EIAR project team comprises a multidisciplinary team of experts with extensive experience in the assessment of wind energy developments and in their relevant area of expertise. Each chapter of this EIAR has been prepared by a competent expert in the subject matter. The chapters of this EIAR are as follows:

1. *Introduction*
2. *Background to the Proposed Development*
3. *Consideration of Reasonable Alternatives*
4. *Description of the Proposed Development*
5. *Population and Human Health*
6. *Biodiversity (excluding Birds)*
7. *Ornithology*
8. *Land, Soils and Geology*
9. *Water*
10. *Air and Climate*
11. *Noise and Vibration*
12. *Landscape and Visual*

13. *Archaeological, Architectural and Cultural Heritage*
14. *Material Assets (including Traffic and Transport, Telecommunications and Aviation)*
15. *Interactions of the Foregoing*
16. *Major Accidents and Natural Disasters*
17. *Schedule of Mitigation and Monitoring Measures*

A Natura Impact Statement has also been prepared in line with the requirements of the Habitats Directive and will be submitted to the Planning Authority as part of the planning application documentation.

1.2 Background to the Proposed Development

This section of the EIAR presents policy information on Energy and Climate Change policy and targets, the strategic, regional, and local planning context for the Proposed Development, scoping and consultation, and the cumulative impact assessment process. A description of reasonable alternatives studied by the developer, relevant to the project including renewable energy technologies, turbine numbers, layout and design is included at Chapter 3 of this EIAR.

The policies and targets which have been put in place at the various levels of Government in relation to renewable energy and climate change illustrate the need for the Proposed Development to assist Ireland in meeting its national targets and European commitments in relation to climate change and decarbonisation. It is of note that latest projections have shown that Ireland is not set to meet its 2020 targets.

The Proposed Development comprises the provision of a wind farm which is capable of generating approximately 120MW of renewable energy and provide it for use onto the national grid. The need to decarbonise the economy and reduce emissions has always been imperative, however in recent years the urgency involved has become clearer to all stakeholders. The Climate Action Plan published by the Government in 2021 sets out the detail for taking action to achieve a 51% reduction in overall greenhouse gas emissions by 2030, and to reach net-zero emissions by no later than 2050. The 2021 Plan builds on the measures and technologies set out in the 2019 Climate Action Plan to deliver greater ambition. The greater ambition requires a greater range of measures under the 2021 Plan, reflected in two categories of 'core measures' and 'further measures'. 'Core measures' set out to meet the 2030 targets cover the fundamentals of decarbonisation and include the development of a renewable energy electricity supply. These 'core measures' are not, by themselves sufficient to deliver the ambitions set out and so a series of 'further measures' will also be necessary which are more technically challenging or not yet available in Ireland at the scale required, e.g., Biogas/biomethane, green hydrogen, carbon capture and storage. While deploying all the core measures would reduce emissions by 10-11 MtCO2eq. by 2030, undertaking further measures could close the gap. All sectors will have to further their efforts from those outlined in the 2019 CAP if the core and further measures are to be achieved.

More recently, the National Energy Security Framework (April 2022) highlights clearly the impacts the Russian invasion of Ukraine and the resulting war has had on Europe's energy system. The resulting decision by the European Union to phase out the import of Russian gas, oil and coal has brought to the fore the importance of security of supply and how energy policy is designed for long-term resilience. It takes account of the need to decarbonise society and economy, to reduce Ireland's emissions by 51% over the decade to 2030 and reach net zero emissions by 2050. According to the SEAI's Energy in Ireland (2020) report, oil accounts for 54% of Ireland's primary energy requirement making it one of the highest rates of oil dependency in the EU. The International Energy Agency, of which Ireland is a member country, includes a 10-point plan to cut oil use which calls for an acceleration in the deployment of wind and solar projects. Ireland's response per the Framework is set out over three themes:

- Theme 1 – managing the impact on consumers and businesses
- Theme 2 – ensuring security of energy supply in the near-term

- Theme 3 – reducing our dependency on imported fossil fuels in the context of the phasing out of Russian energy imports across the EU

In relation to theme 3 the Framework highlights that replacing fossil fuels with renewables, including wind energy, will be a focus area of work. The Framework calls for "*Supportive policies across Government and State agencies"* which *"can reduce barriers and fast track permitting for renewable energy generation projects. Similarly, renewable energy developers need to match this through taking a leadership role in delivering high quality applications to relevant consenting authorities, meeting project milestones on time and minimising delays."* Response 25 set out is in relation to the alignment of all elements of the planning system to support accelerated renewable energy development.

The primary driver behind the Proposed Development is the need to provide additional renewable energy to offset the use of fossil fuels within the electricity generating sector. Increasing electricity generation from wind power represents the most economical renewable option to reduce emissions within the power generation sector and is the most mature technology available to achieve national targets that have been established for decarbonisation.

Energy and Climate Change Targets

Relevant to the Proposed Development, the Climate Action Plan 2021(CAP) details the Plan's views surrounding electricity generation. It sets out the detail for taking action to achieve a 51% reduction in overall greenhouse gas emissions by 2030, and to reach net-zero emissions by no later than 2050. The 2021 Plan builds on the measures and technologies set out in the 2019 Climate Action Plan to deliver greater ambition. The greater ambition requires a greater range of measures under the 2021 Plan, reflected in two categories of 'core measures' and 'further measures. 'Core measures' set out to meet the 2030 targets cover the fundamentals of decarbonisation and include the development of a renewable energy electricity supply. These 'core measures' are not, by themselves sufficient to deliver the ambitions set out and so a series of 'further measures' will also be necessary which are more technically challenging or not yet available in Ireland at the scale required, e.g., Biogas/biomethane, green hydrogen, carbon capture and storage. While deploying all the core measures would reduce emissions by 10-11 MtCO2eq. by 2030, undertaking further measures could close the gap. All sectors will have to further their efforts from those outlined in the 2019 Plan if the core and further measures are to be achieved.

Achieving 70% renewable electricity by 2030 will involve increasing renewable electricity generation, reinforcing the existing grid network (including greater interconnection to allow electricity to flow between Ireland and other countries) and putting systems in place to manage intermittent sources of power, especially from wind. Ultimately, the measures needed to deliver the 2030 targets centre on the increased harnessing of renewable energy. The Climate Action Plan sets out the need to deliver up to 8.2GW total of onshore wind capacity. As of 2019, there is 4.1GW of installed wind capacity in Ireland; therefore, Ireland needs to more than double its installed capacity of wind generation. The addition of the Proposed Development to Ireland's deployable onshore wind farm fleet would result in a direct positive impact on current output, and furthermore, the continued progression towards future targets.

With regards electricity, the Plan aims to increase the proportion of renewable electricity up to 80% by 2030. The Plan highlights that *"sustained efforts across sectors will be required to meet targets"* and for electricity "*The proposed pathway includes a more rapid build-out of renewable generation capacity (wind and solar power generation technologies), increased storage, and the deployment of zero-emissions gas. The decarbonisation pathway for the electricity sector is challenging given the rapid growth in demand for power, as well as the need to ensure security of supply through the decarbonisation journey."* To achieve the 80% renewable electricity envisioned, the indicative onshore wind capacity is set in the Plan at up to ~8GW.

In June 2021, the EPA published an update on *Ireland's Greenhouse Gas Emission Projections 2020-2040* (the "Report") using the latest Inventory data for 2019. The report provides an assessment of Ireland's progress towards achieving its emission reduction targets for 2020 and 2030 as set out under

the EU Effort Sharing Decision (ESD) and Effort Sharing Regulation (ESR). Ireland's 2020 target under the ESD is to achieve a 20% reduction on 2005 levels of non-Emissions Trading Scheme (non-ETS) sector emissions (agriculture, transport, residential, commercial, non-energy intensive industry, and waste) with annual binding limits are set for each year over the period 2013-2020. Ireland's 2030 target under the Effort Sharing Regulation (ESR) is a 30% reduction of emissions compared to 2005 levels by 2030. The key findings set out within the report concerning Ireland's progress towards these targets, and relevant to the subject development, the overall decarbonising of the national energy system,

In the context of Ireland's failure to meet the 2013-2020 EU targets for greenhouse gas emissions reductions and the possible outcomes under the above scenarios, the EPA emphasises the need for a 'significant and immediate' response to reducing carbon emissions:

"However, for Ireland to meet the more ambitious targets as presented in the European Climate Law [55% emission reduction by 2030 as per 1990 levels] and Ireland's Climate Bill [51% emission reduction by 2030], and to transform to a climate resilient, biodiversity rich and climate neutral economy by 2050, there needs to be a significant and immediate increase in the scale and pace of greenhouse gas emission reductions. A 'green recovery' will give Ireland an opportunity to rebuild our economy and generate new jobs while responding to this challenge."

Drawing on the 2030 Climate and Energy Framework EirGrid's *'All Island Generation Capacity Statement 2021 – 2030'* (September 2021) states that the national power system will require unprecedented change over this decade, "a fundamental transition for our electricity sector", to accommodate at least 70% of electricity from renewable sources by 2030. The retiring of traditional fossil fuel plant (coal, peat and oil-fired generators), c. 1,650MW of generation over the next 5-years within Ireland, further emphasises the need for a deliberate and swift transition to a low-carbon power system based on renewable energy, natural gas and ancillary supporting infrastructure. With regard to wind energy, the *All Island Generation Capacity Statement 2021 – 2030* states that,

"It can be assumed that Ireland's renewable targets will be achieved largely through the deployment of additional wind powered generation."

New onshore wind farms commissioned in Ireland in 2020 brought the total wind capacity to 4,300MW, contributing to the increase in overall RES percentage to 43.3%. This value is set to increase as Ireland endeavours to meet its 2030 renewable targets; specifically, the *All Island Generation Capacity Statement 2021 – 2030* estimates that onshore wind energy will increase by 1,000MW between 2020 and 2025. Regarding wind energy, the Statement states that,

"It can be assumed that Ireland's renewable targets will be achieved largely through the deployment of additional wind powered generation."

Local Policy

The site of the Proposed Development is entirely within the administrative area of Roscommon County Council. As such the recently adopted Roscommon County Development Plan 2022-2028 is relevant.

The Development Plan recognises the importance of addressing climate change noting at Chapter 1 that *"the Plan has been prepared against the critical need to address climate change..."*. The Plan includes a dedicated Renewable Energy Strategy (RES) where the primary aim is to "*ensure that the county continues to address climate change through facilitating appropriately located renewable energy developments and through supporting energy efficiency in all sectors of the economy."*

The RES "sets out the framework for the delivery of sustainable and renewable energies throughout the county." Through the RES the Council has set out its commitment to "implementing the strategic aims set out in the RES, to ensure that Roscommon delivers upon its commitment to tackle climate change, through facilitating appropriate renewable energy development proposals in the county."

A range of strategic aims are set out in the RES which are set out in full in Chapter 2 of the EIAR. The Aims 1 – 11 (inclusive) support and encourage achieving national energy targets for energy to be generated from renewable resources and state at RES AIM 3 "*Encourage and facilitate the various forms of renewable energy development explored in this Strategy, provided they are in accordance with the principles of proper planning and sustainable development. Wind energy developments will be permitted in areas designated as "Most Favoured" primarily, subject to normal planning practices."* RES AIM 5 adds: *"Ensure that renewable energy developments do not undermine the preservation and conservation of the natural and built environment and that an appropriate balance is achieved between development and preservation of the natural environment."*

Section 3 of the RES discusses the renewable energy resources and potential in the county, noting that "at present there is 112 MW of renewable energy being generated in County Roscommon, with the potential for 262MW to be produced.". If the Proposed Development where to receive a grant of permission, the development would double the current capacity and contribute to County Roscommon's renewable energy targets.

Figure 7 of the RES illustrates the 'Areas Suitable for Wind Development'. The majority of the wind turbines and associated works are located in an area deemed 'Most Favoured' with 4 no. wind turbines located in 'Not Favoured' area. Having reviewed the sieve analysis used in arriving at the wind energy zones, and following the findings of this EIAR, it is clear that the 'Not Favoured' area in question has no evidence base or scientific justification and the assessment of the proposals in this area are found here to represent proper planning and sustainable development along with the wider wind energy development as proposed.

Wind Energy Development Guidelines

The relevant considerations under the '*Wind Energy Development Guidelines for Planning Authorities*' (Department of the Environment, Heritage and Local Government (DOEHLG), 2006) have been taken into account during the preparation of this EIAR.

The '*Wind Energy Development Guidelines for Planning Authorities*' (DoEHLG, 2006) are currently the subject of a targeted review. The Department of Housing, Planning and Local Government published the *Draft Wind Energy Guidelines* (referred to as the Draft Revised Guidelines) in December 2019 and these Draft Guidelines were under public consultation until 19th February 2020. Following the previous 2013 consultation and subsequent detailed engagement between the relevant Government Departments, a "preferred draft approach" to inform and advance the conclusion of the review of the 2006 guidelines was announced in June 2017.

In line with the previously stated "preferred draft approach", the 2019 Draft Guidelines primarily focus on addressing a number of key aspects including, but not limited to:

- Acceptable noise thresholds and monitoring frameworks;
- Visual amenity setback and spacing;
- Control of shadow flicker;
- Compliance with Community consultation and dividend requirements, as included within the obligatory Community Report; and
- Consideration of the siting, route and design of the proposed grid connection as part of the whole project.

Similar to the 2006 Guidelines, the Draft Revised Guidelines also state that underground grid connections for wind energy projects are considered the most appropriate environmental and/or engineering solution (e.g., default approach), particularly in sensitive landscapes.

The EIAR is cognisant of the *Draft Revised Wind Energy Development Guidelines* and will address each key matter (e.g., noise and shadow flicker standards) in turn within the relevant sections of this EIAR. As demonstrated in the subsequent chapters, the Proposed Development will not result in any likely significant effects on the receiving environment. In relation to the Shadow Flicker, the proposed wind farm can satisfy the draft guidelines requirement as this is an operational matter that can be controlled by the SCADA system if necessary. In relation to the noise elements of the Draft Guidelines, it is this section that has given rise to the most scrutiny from industry experts who have sought significant amendments and clarifications. While the outcome of the public engagement process on the Draft Revised Guidelines is not yet known, the operational noise parameters can be controlled using the SCADA system, and therefore, the Proposed Development will ultimately comply with future guidelines should they be adopted/finalised during the consideration period of the current application.

Planning History

The relevant planning history of the Proposed Development site, the planning applications in the vicinity of the site along with other wind energy applications within the wider area are set out at Section 2.3 of this EIAR.

Scoping and Consultation

Scoping is the process of determining the content, depth and extent of topics to be covered in the environmental information to be submitted to a competent authority for projects that are subject to an Environmental Impact Assessment. This process is conducted by contacting the relevant authorities and Non-Governmental Organisations (NGOs) with interest in the specific aspects of the environment with the potential to be affected by the proposal. These organisations are invited to submit comments on the scope of the EIAR and the specific standards of information they require. Comprehensive and timely scoping helps ensure that the EIAR refers to all relevant aspects of the subject development and its potential effects on the environment and provides initial feedback in the early stages of the project, when alterations are still easily incorporated into the design. In this way scoping not only informs the content and scope of the EIAR, it also provides a feedback mechanism for the proposal design itself.

A scoping report, providing details of the application site and the subject grid connection, was prepared by MKO and circulated in August 2020 to relevant parties. The scoping report issued provided information on the topics below and is included in this EIAR.

- Description of the Proposed Development Site, including Site Location and Access, Land-Use, Designated Areas and Landscape Policy;
- Planning Context;
- Site Selection;
- Description of the Proposed Development; and
- Scope of the EIAR and Natura Impact Assessment

MKO requested the comments of the relevant personnel/bodies in their respective capacities as consultees with regards to the EIA process. Details of that scoping progress can be found at Section 2.4 of this EIAR.

Scoping responses received are set out in the EIAR at Table 2-9 of Section 2.4 of Chapter 2. The recommendations of the consultees have informed the EIAR preparation process and contents of same.

1.3 Consideration of Reasonable Alternatives

This chapter of the EIAR includes a description of the reasonable alternatives studied by the developer which are relevant to the project and its specific characteristics and an indication of the main reasons for the option chosen, taking into account the environmental effects. The consideration of alternatives

typically refers to alternative design, technology, location, size and scale. A 'Do Nothing Scenario' i.e., an outline of what is likely to happen to the environment should the Project not be implemented, should also be included.

Alternative Locations

The site selection process for the Proposed Development has been fully informed by national, regional and local policy at a macro level (see Chapter 2: Background to the Proposed Development) and site-specific factors that influence the turbine layout and project design on site at a micro level. The key policy, planning and environmental considerations for the selection of a potential wind farm site are detailed in the Table 1-2 below.

Table 1-2 Strategic Site Selection

Key policy, planning and environmental considerations	Application Site
Site location relative to Roscommon County Council's Renewable Energy Strategy (RES) 2022-2028 classification of areas considered suitable for wind farm development	"**Most Favoured**" for wind energy development
Low population density	6.4 persons per square kilometre. This is significantly lower than the average national population density of 68.1 persons per square kilometre
Consistent wind speeds	Irish Wind Atlas records average wind speeds for this area as 8.70m/s to 8.9m/s at a 150m elevation. This speed is viable for commercial wind energy development
Protection of visual amenity:	"**Moderate Value**" Landscape Character Type Roscommon County Development Plan 2022-2028 provides a range of landscape character types with Exceptional Value being the highest and Moderate Value being the lowest.
Low potential for impact on designated National and European sites	No National or European Designations within or immediately adjacent to the site location
Access to the national electricity grid possible within a viable distance	Nearest node is 10km from application. No overhead lines required which is in agreement with the Roscommon Development Plan 2022-2028
Sufficient area of unconstrained land that could potentially accommodate wind farm development and turbine spacing requirements	Viable area of 588ha which can comfortably accommodate 20 no turbines and all ancillary infrastructure. Proposed turbines are a minimum 724m set back from residential receptors.

In addition to the above, the site's planning history was also a key factor in selecting this location for a proposed wind energy development. The Proposed Development site, as detailed in Chapter 1, Section 1.2, was subject to two previous planning applications in October 2011 and September 2013 for a total of 35 no. turbines (16 no. turbine development in the Phase 1 and 19 no. turbines in the Phase 2). As such, this site has been subject to long-term, comprehensive site surveys and investigations with the result being that considerable knowledge of the site and surrounding area has been gleaned over time. Retaining this location and building upon this knowledge was considered both economical and practical. The knowledge gained and learned from previous design iterations was used to inform the current design and consequently, the scale of the development reduced from the initial 35 no. turbine layout to the proposed 20 no. turbine layout.

Alternative Design

Following the sites planning history, the design of the Proposed Development has been an informed and collaborative process from the outset, involving the designers, developers, engineers, environmental, hydrological and geotechnical, archaeological specialists and traffic consultants. The design process has also taken account of the recommendations and comments of the relevant statutory and non-statutory organisations, near neighbours / the local community and local authorities as detailed in Sections 2.4 and 2.5 of this EIAR. The aim of the process being to reduce the potential for environmental effects of earlier design iterations while designing a project capable of being constructed and viable. Further to this, a Constraints and Facilitators mapping exercise was undertaken for the Proposed Development.

The final design output takes account of all previous site iterations, site constraints and the distances to be maintained between turbines and from houses, roads, etc. The layout is based on a combination of the results of all site investigations and surveys that have been carried out during the EIAR process, the community engagement process that began in July 2019 (e.g., landscape and visual sensitivities of nearby residents was taken into consideration) and the scoping with statutory and non-statutory consultees. As information regarding the site of the Proposed Development was compiled and assessed, the proposed layout has been revised and amended to take account of the physical constraints of the site and the requirement for buffer zones and availability of land as well as cumulative impacts.

Alternative Turbine Quantity

As mentioned above, a wind turbine model with a rated output of 6.0 MW is considered to be representative of the typical turbine capacity currently available. This output will generate approximately 120MW from the proposed 20 no turbine wind energy development. Such an output could also be achieved on the proposed site by using smaller turbines (for example 4.0 MW machines). However, this would necessitate the installation of 30 turbines to achieve a similar output. Furthermore, the use of smaller turbines would not make efficient use of the wind resource available having regard to the nature of the site.

Alternative Grid Route

Two grid connection routes were assessed by AECOM and discussed with Roscommon County Council. The preferred option, Option 1 was considered the most viable option for connecting the Proposed Development to the national grid. This connection method avoided an area that RCC have designated as an area for commercial development and was therefore considered the most suitable route. Furthermore, the area surrounding Grid Connection Option 2 was highlighted as having the potential for geotechnical issues. Please see Table 3-8 of Chapter 3 Consideration of Reasonable Alternatives for a comparison of both grid options.

Alternative Port of Entry

An assessment of the most suitable port of entry for turbine components looking at Dublin, Cork, Galway, Limerick and Waterford, was undertaken. While future technologies and development in both turbine manufacture and port design will dictate the final chosen port, delivery from Galway was assessed in the accompanying EIAR.

Alternative Site Access Points

An assessment of 3 no alternative access points was undertaken:

- Access A on the R363 Regional Road into Northern Cluster of turbines (T1 to T7).
- Access B on the L7535 Local Road at the junction with R363, into the southwest Southern Cluster of turbines (T8 to T18), and
- Access C on the R363 Regional Road, into the southeast Southern Cluster turbines (T19 and T20) and proposed substation

One option was to include just two access points into the site- one per turbine cluster. A second option was to use all 3 access points. Following engagement with local residents, the latter was selected as the best option as it spread construction traffic more evenly across the road network, reducing the potential for traffic disruption.

1.4 Description of the Proposed Development

The overall layout of the Proposed Development is shown on Figure 4-1 in Chapter 4 of the EIAR. This drawing shows the proposed locations of the wind turbines, electricity substation, construction compounds, internal roads layout and the site entrances. Detailed site layout drawings of the Proposed Development are included in Appendix 4-1 to this EIAR.

The proposed wind turbine layout has been optimised using industry standard wind farm design software to maximise the energy yield from the site, while maintaining sufficient distances between the proposed turbines to ensure turbulence and wake effects do not compromise turbine performance.

The proposed 20 no. wind turbines are separated into a Northern Cluster (7 no turbines) and Southern Cluster (13 no. turbines). The turbines to be installed will have a ground-to-blade tip height, hub height and rotor diameter with the following:

- Turbine Tip Height: 180 metres
- Hub Height: 90 metres
- Rotor Diameter: 162 metres

Modern wind turbines from the main turbine manufacturers have evolved to share a common appearance and other major characteristics, with only minor cosmetic differences differentiating one from another. The wind turbines that will be installed on the site will be conventional three-blade turbines, that will be geared to ensure the rotors of all turbines rotate in the same direction at all times. It is proposed that the turbines will be grey matte in colour.

Each wind turbine is secured to a reinforced concrete foundation that is installed below the finished ground level. The turbine foundation transmits any load on the wind turbine into the ground. The hard standing areas at each turbine consist of levelled and compacted hardcore are required around each turbine base. These will facilitate access, turbine assembly and turbine erection. The hard-standing areas are used to accommodate cranes used in the assembly and erection of the turbine. The hardstands also allow for the offloading and storage of turbine components, and generally provide a safe, level working area around each turbine position. Levelled assembly areas will be located on either

side of the hard-standing area. These levelled assembly areas are required for offloading turbine blades, tower sections and hub from trucks until such time as they are ready to be lifted into position by cranes.

To provide access within the site of the Proposed Development and to connect the wind turbines and associated infrastructure approximately 635 metres of existing site roads and tracks will need to be upgraded and approximately 18.7 kilometres of new access roads will need to be constructed.

It is proposed to construct a 110kV electricity substation within the site of the Proposed Development as shown in Figure 4-1. It is located within an area of improved agricultural grassland, approximately 465m south of the R363 Regional Road and approximately 400m northeast of the proposed Turbine No. 18. The proposed onsite electrical substation will be served by a separate access road to the Wind Farm from the R363 which will allow access for maintenance to the substation by ESB / EirGrid.

Each turbine will be connected to the on-site electrical substation via an underground 33 kV (kilovolt) electricity cable. Fibre-optic cables will also connect each wind turbine to the Wind Farm control building in the onsite electrical substation.

It is proposed to connect the two clusters of the site via underground cabling located within existing agricultural land and within the public road corridor. This IPP cabling route measures approximately 3.8 km and is shown on Figure 4-15. The cable, ducting and trenching specifications provided within this application are in accordance with standard ESB specifications. The final specification for the cable, ducting and trench to be lain within the proposed route as shown on Figure 4-15.

One permanent meteorological (met) mast is proposed as part of the wind farm development. The met mast will be equipped with wind monitoring equipment at various heights. The proposed met mast is located in the Norther Cluster of the site, approximately 200 meters northwest of Turbine No. 5, as shown on the site layout drawing in Figure 4-1. The proposed met mast will be a self-supporting slender structure measuring 100 metres in height.

Two temporary construction compounds, one in each cluster, are proposed as part of the wind farm development. The construction compounds will consist of temporary site offices, staff facilities and car-parking areas for staff and visitors.

A Spoil Management Plan (Appendix 4-7) details the volumes of materials (rock, spoil) generated and reused during construction and the volume of materials remaining (overburden) to be managed on site.

The excess peat and spoil will be managed by means of placement within overburden storage areas, as shown on in Figures 4-9 to 4-11. A total of 6 no. overburden storage areas as well as storage around 15 turbines are proposed and are illustrated in Figure 4-1. These areas have been selected based on the locations of spoil generation, areas suitable for spoil storage and environmentally constrained areas. In addition to this, some excavated materials will be placed temporarily alongside access roads or used for landscaping.

A total of three site entrances are proposed for the construction and operational stage of the Proposed Development in order to transport turbine components, materials and equipment to the site.

Access A will be used for abnormal loads (i.e., turbine components) as well as providing access for all general construction traffic (i.e., non-turbine components) to the Northern Cluster of the Proposed Development. It will also provide access for maintenance staff to the Northern Cluster when operational.

Access B will provide for the delivery of abnormal loads, the delivery of general construction materials, and all construction traffic to the southwest Southern Cluster. Following the construction phase of the Proposed Development, the upgraded area of this entrance will be closed by erecting fencing, however this may be reopened during the operational phase of the development should replacement blades, abnormal loads or maintenance staff be required to access the site

Access C will provide access and egress to the southeast Southern Cluster of turbines in the Southern Cluster (T19 and T20) for abnormal loads as well as providing access to the proposed electrical substation location.

It is intended that the port of entry for large turbine components will be the Galway Port and Harbour. Specialised delivery vehicles will transport turbine components from the Port, along the M6 Motorway before exiting northwest at Monksland on to the R362 Regional Road. The route then travels northwest on the R362 Regional Road for approximately 5.5km, before merging left on to the R363 Regional Road. The turbine delivery route continues west along the R363 for approximately 6km before arriving at the Proposed Development location.

If this project is constructed as currently designed, the fund will invest in excess of €300,000 a year (€9 million over the projects lifetime) in local community projects, based on a minimum annual investment of €16,000 per turbine. This represents a dependable source of investment for the communities living in the vicinity of Proposed Development. The fund will be administered by an independent charitable trust and will prioritise energy efficiency and sustainability goals. It will be designed and regularly reviewed in conjunction with local community groups to meet local needs. Any funds not spent within the corresponding twelve months will be rolled over to spend the following year. An annual record of all project funding, together with an impact assessment, will be made publicly accessible. The fund will prioritise households within 1km of the wind turbines by offering electricity bill payers an annual contribution of €1,000 towards their electricity usage. The Community Benefit Fund is detailed further, alongside all community engagement and stakeholder engagement, in Appendix 2-2 of this EIAR.

The protection of groundwater and surface water within and surrounding the site, and downstream catchments that they feed has been of utmost importance in considering the most appropriate drainage proposals for the site of the Proposed Development. The Proposed Development's drainage design has therefore been proposed specifically and ensures minimal impact with regards the existing flow regime across the site, in particular having no negative impact on the water quality of the site and consequently no impact on downstream catchments and ecological ecosystems. No routes of any natural drainage features will be altered as part of the Proposed Development. Watercourses are absent within the Wind Farm site, only occurring along the Grid Connection route, however potential impacts in relation to potential overland flow towards surface water bodies such as turloughs will nonetheless be mitigated against, as well as surface water runoff that will occur at site infrastructure that will need to be recharged locally into subsoils. This recharge water will occur close to source and can migrate vertically to groundwater below the site. There will be no direct discharges to any natural watercourses, with all drainage waters being dispersed as overland flow/recharge. All discharges (via groundwater recharge) from the proposed works areas will be made over vegetation filters at an appropriate distance from the works areas. Buffer zones around the existing natural drainage features (turloughs and karst features for the Wind Farm site) have been used to inform the layout of the Proposed Development.

The construction phase can be broken down into four main phases, which overlap partially: 1) grid connection works – 3-6 months, 2) site preparation and civil engineering works - 10 months, 3) electrical works - 6 months, and 4) turbine erection and commissioning - 8 months.

During the operational phase, each turbine will be subject to a routine maintenance programme involving a number of checks and changing of consumables, including oil changes. In addition, there will be a requirement for unscheduled maintenance, which could vary between resetting alarms to major component changes requiring a crane. Typically, maintenance traffic will consist of four-wheel drive vehicles or vans. The electricity substation and site tracks will also require periodic maintenance.

The wind turbines proposed as part of the Proposed Development are expected to have a lifespan of approximately 30 years. Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the Proposed Development may be decommissioned. The onsite substation will remain in place as it will be under the ownership of the ESB/Eirgrid.

1.5 Population and Human Health

One of the principal concerns in the development process is that individuals or communities, should experience no significant diminution in their quality of life from the direct or indirect effects arising from the construction, operation and decommissioning of a development. Ultimately, all the impacts of a development impinge on human health, directly and indirectly, neutral, positively and negatively. The key issues examined in this chapter of the EIAR include population, human health, employment and economic activity, land-use, residential amenity, community facilities and services, tourism, property values, shadow flicker, noise and health and safety.

The Proposed Development site is located northeast and southeast of the village of Dysart, approximately 1.5 kilometres away at its closest point and approximately 11 kilometres northwest/west of the town of Athlone, Co. Roscommon. There are no key identified tourist attractions pertaining specifically to the site of the Proposed Development itself.

The closest third-party dwelling to the Proposed Development is located approximately 724m from the nearest proposed turbine (T8), i.e., greater than the recommended setback distance (i.e., 4 times the tip height, 720m), as per the *Draft Revised Wind Energy Development Guidelines* (Department of Housing, Planning and Local Government, December 2019 (currently out for public consultation)).

The Study Area for the Population and Human Health assessment was defined by the 6 No. District Electoral Division (DED)s within and adjacent to the development site. The population of the DEDs within the Study Area decreased by 1.7% between 2011 and 2016, falling from 2,166 to 2,129 persons, respectively, with the rate of population change unevenly distributed between the DEDs. The percentage labour force for the Study Area population was 60.2% which is lower than for the State as a whole (61.4%), but higher than for Co. Roscommon (58.3%). The percentage of the Study Area labour force who are unemployed is lower than the State and lower than County Roscommon, at 7.3%.

As stated above, approximately 100 jobs could be created during the construction, operation and maintenance phases of the Proposed Development with most construction workers and materials sourced locally, thereby helping to sustain employment in the construction trade. This will have a Short-Term Significant Positive Impact.

There is currently no published credible scientific evidence to positively link wind turbines with adverse health effects. The main publications supporting the view that there is no evidence of any direct link between wind turbines and health are summarised in Chapter 5 of this EIAR. Although there have been no empirical studies carried out in Ireland on the effects of wind farms on property prices, it is a reasonable assumption based on the available international literature that the provision of a wind farm at the proposed location would not impact on the property values in the area.

Shadow flicker is an effect that occurs when rotating wind turbine blades cast shadows over a window in a nearby property. Shadow flicker may be experienced by an occupant sitting in an enclosed room when sunlight reaching the window is momentarily interrupted by a shadow of a wind turbine's blade. Shadow flicker effect lasts only for a short period of time and happens only in certain specific combined circumstances. Current guidelines recommend that shadow flicker at neighbouring dwellings within 500 metres of a proposed turbine location should not exceed a total of 30 hours per year or 30 minutes per day.

There are 109 No. properties located within one kilometre of any proposed turbine locations, of which six are derelict, while the remaining 103 No. properties are habitable dwellings. A minimum separation distance of 724m from the wind turbine (T8) to the nearest point of any occupied, non-participating, residential dwelling (H62) has been achieved with the project design.

The developer has adopted the current 2019 Draft Wind Energy Guidelines (DoEHLG) recommendation that no Shadow Flicker exceedance will occur at any property as a result of the Proposed Development

The potential flicker that will occur at houses located within the area surrounding the Proposed Development was calculated using the WindFarm software package and a regional sun factor of 30% was applied. Of the 296 No. residential properties modelled ((i.e., the shadow flicker study area of ten times the rotor diameter; 10x162 = 1,620m), it is predicted that 194 No. properties may experience some daily shadow. However, this prediction does not consider wind direction or screening provided by intervening vegetation and topography.

Where shadow flicker exceedances are experienced, suitable mitigation measures as outlined in Chapter 5 will be employed at the potentially affected properties to ensure that the cu2019 Draft Wind Energy Guidelines are complied with at any dwelling within the 1.62km study area. Therefore, the developer will commit to mitigation measures that will ensure that there are no occurrences of shadow flicker for any property within the 1.62km study area, as a result of the Proposed Development.

Impacts on human beings during the construction and operational phases of the Proposed Development are described in Chapter 5 in terms of health and safety, employment and investment, population, land-use, noise, dust, traffic, tourism, residential amenity, renewable energy production and reduction in greenhouse gas emissions, shadow flicker and interference with communication systems. Where a negative impact was identified, the appropriate mitigation measures will be put in place to ensure that there will be No Adverse Impacts on human health in the surrounding area.

Following consideration of the residual effects (post-mitigation), the Proposed Development will not result in any significant effects on population and human health. Provided that the proposed wind farm development is constructed and operated in accordance with the design, best practice and mitigation that is described within this application, significant effects on population and human health are not anticipated at international, national or county or local scale.

1.6 Biodiversity

This chapter assesses the likely significant effects (both alone and cumulatively with other projects) that the Proposed Development may have on Biodiversity, Flora and Fauna and sets out the mitigation measures proposed to avoid, reduce or offset any potential significant effects that are identified.

Multidisciplinary walkover surveys were undertaken on the 25th October, 17th December 2019, 8th & 22nd May, 22nd July, 04th September & 24th September 2020, 31st March 2021 and 29th October 2021. The majority of survey timings fall within the recognised optimum period for vegetation surveys/habitat mapping, i.e. April to September (Smith et al., 2011). A comprehensive walkover of the entire site was completed, with incidental records also incorporated from other dedicated species/habitat specific surveys including for otter, bats, marsh fritillary and detailed habitat assessment surveys.

The multi-disciplinary walkover surveys comprehensively covered the lands within the EIAR Site Boundary and based on the survey findings, further detailed targeted surveys were carried out for features and locations of ecological significance. These surveys were carried out in accordance with NRA Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes (NRA, 2009).

During the multidisciplinary surveys, a search for Invasive Alien Species (IAS) listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) was conducted.

The habitats on the site of the Proposed Development were the subject of a detailed survey and assessment and a habitat mapping. This habitat mapping and assessment was undertaken following the

'A Guide to Habitats in Ireland' (Fossitt, 2000). Calcareous grassland habitats have also been categorised to plant communities from the National Survey of Upland Habitats (Perrin et al. 2014) and the Irish Vegetation Classification.

Grasslands makes up a significant proportion of the habitats within the Proposed Development site. The EIAR survey area comprises large areas of improved agricultural grassland (Fossitt code GA1) and Dry calcareous and neutral grassland (GS1). The areas of improved agricultural grassland have primarily been intensively managed for sheep and cattle grazing, and many of the fields surveyed have been reseeded with perennial ryegrass. Areas of Dry calcareous and neutral grassland comprise of a mix of both semi-natural and semi-improved grasslands. Some areas mapped as Dry calcareous and neutral grassland (GS1) have been subject to intensive grazing, primarily sheep and cattle grazing, The areas of Dry calcareous and neutral grassland (GS1) not subject to agricultural improvement also occur in association with patches of scrub and limestone boulders. Turbines no. T9, T10, part of T12, part of T13, part of T16, and a number of proposed site access roads occur within this habitat. This grassland is species rich and of high biodiversity value. A number of fields within the EIAR Site Boundary have also been used for arable crop production. Turloughs are present within the surrounding area, and a portion of this habitat is present within the Northern Cluster of the Proposed Development site.

Stone walls (BL1) are the dominant boundary feature within the survey area given the nature of the boulder strewn landscape. In places, these stone walls have become enveloped by bramble and some lined with blackthorn, hawthorn or hazel. Hedgerows (WL1) also occur throughout the survey area, usually in association with stone walls.

The construction of the proposed windfarm and associated infrastructure will result in the direct loss of approximately 2.7 hectares of Annex I grassland habitat ([6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid sites)), associated with parts of the footprints of Turbines T09, T10, T12, T13, T15 and T16 and associated site access tracks. The remaining areas of this habitat within the EIAR study area boundary have been entirely avoided in the design of the project with no potential for any effect thereon. The Proposed Development provides for the restoration and enhancement of other grassland habitat totalling approximately 9-12 hectares (a minimum of three times of the area lost to the footprint), full details of which are provided in the Biodiversity Mitigation and Enhancement Plan (BMEP) for the Proposed Development. It is additionally proposed to restrict the reclamation of all Calcareous grasslands with Annex 1 affinities [6210/6210*] occurring within the EIAR Site Boundary in agreement with the relevant landowners. In addition, the lands will continue to be subject to low intensity grazing to maintain these areas in their current good condition. Following implementation of the BMEP, these proposed measures will result in a long-term net gain in this habitat within the locality of the Proposed Development.

Approximately 2.53km of hedgerow/scrub will be permanently removed within and around the footprint of the Proposed Development. Removal of this combined length hedgerow/scrub is required to achieve the required buffer distance for the protection of bats, from the turbines to the canopy of the nearest habitat feature, as recommended by the Natural England (2014) and NatureScot (2021). To compensate for the loss of 2.53km of hedgerow it is proposed to plant 2.82km of new hedgerow to offset this potential loss and to provide additional habitat connectivity within the site. Overall, the proposed replanting will result in a net gain of approximately 290m in the linear landscape features within the site.

Bat species composition and abundance was found during detailed bat surveys undertaken at the site to be typical of the geographic location and the largely open nature of the Proposed Development site, and the site is utilised by a regularly occurring bat population of Local Importance. No potential for residual significant effects with regard to loss of commuting and foraging habitat, loss or damage to roosts, displacement or other construction phase impacts have been identified; the proposed net gain in linear landscape features within the site will result in a long-term positive impact on bats at the local level. In relation to potential collision risk and injury with operational turbines, a bespoke adaptive monitoring and mitigation strategy has been devised for the Proposed Development in line with

NatureScot (2021) Guidance, which will ensure that there is no potential for significant residual effects on local bat populations during the operational phase of the wind farm.

Two single entrance outlying badger sett was recorded within the EIAR boundary. Therefore measures including a pre-construction survey and additional monitoring where necessary to identify all active setts within proximity of the wind farm infrastructure at the time of construction will allow for any mitigation required to be implemented to ensure that no undue disturbance to badgers takes place during the construction phase. In addition, detailed bat and aquatic receptors and fisheries surveys have been undertaken as part of the detailed baseline assessment, the detailed results of which are provided in technical appendices to this EIAR. No evidence of populations of these species being significant at more than a local level was recorded. No signs of any additional protected fauna were recorded within the study area during the survey work undertaken.

No significant effects on surface water quality, groundwater quality or the hydrological/ hydrogeological regime were identified during construction, operation or decommissioning. A full hydrological assessment in relation to the Proposed Development has been carried out in Chapter 9 of the EIAR.

It is therefore judged that, provided that the Proposed Development is constructed and operated in accordance with the design, best practice and mitigation that is described within this application, significant residual impacts on ecology will not occur.

1.7 Ornithology

Following the implementation of good practice measures no significant negative effects on valued ornithological receptors (VORs) are likely during the construction or decommissioning phases of the Proposed Development.

A comprehensive suite of bird surveys was undertaken at the Proposed Development which have informed the impact assessment. These included flight activity surveys, breeding wader surveys, breeding raptor surveys, swan and goose feeding distribution surveys, Greenland white-fronted goose roost surveys and European golden plover nocturnal foraging surveys.

The field survey methodologies were all carried out using survey standards recommended by NatureScot (formerly Scottish Natural Heritage (SNH), 2017), which are widely regarded as representing standard best practice in Ireland and were carried out during suitable times of the year. Three full years of surveys have been completed, which is in excess of the two full years recommended by current NatureScot (2017) guidance. No significant gaps in the assessment have been identified.

During operation, collision risk mortality is likely to affect the following VORs: whooper swan, Greenland white-fronted goose, Eurasian wigeon, peregrine falcon, European golden plover, northern lapwing, Eurasian curlew and black-headed gull.

The likely potential impact of collision mortality on Eurasian curlew and black-headed gull would be of potential regional/county significance, although this is based on a number of precautionary assumptions and the true level of mortality is considered likely to be lower.

The likely potential impact of collision mortality on the other species assessed (including the qualifying features for all designated sites within at least 15 km) would not be significant. These species include whooper swan, Greenland white-fronted goose, Eurasian wigeon, peregrine falcon, European golden plover, northern lapwing, common scoter, common coot, mallard and Eurasian teal.

All other potential impacts on the species assessed, including nest damage or destruction, habitat loss (direct and indirect), disturbance/displacement and barrier effects would be non-existent or non-significant.

1.8 Land, Soils and Geology

The Proposed Development will be located approximately 1.5 kilometres away northeast and southeast of the village of Dysart, and approximately 11 kilometres northwest/west of the town of Athlone, Co. Roscommon. The Proposed Development is bisected by the R363, to form the Northern and Southern Clusters of the Wind Farm site. The Northern Cluster is located ~ 1.6km northeast of Dysart and consists of 7 no. turbines within a ~ 2 km^2 area between the townlands of Cronin, Gortaphuil and Cornalee. The Southern Cluster consists of 13 no. proposed turbine locations over a ~ 5km^2 area, from the townland of Milltown towards Cuilleenoolagh and Cam Hill.

A comprehensive impact assessment of the Wind Farm site and associated Grid Connection route on the land, soils and geological environment has been undertaken. The assessment is based on a desk study, walkover surveys and a comprehensive data set which was obtained during site investigations. The wind farm design is based on extensive site-specific data, with the layout intended to minimise impacts on the local land, soils and geological environment.

Landuse within the Wind Farm site is primarily agricultural, under grass pasture and used mainly for grazing of sheep with some areas of rough scrub, which is often strewn with boulders.

The geology of the proposed Wind Farm site has been characterised using desk study and site investigation data. The Wind Farm site is underlain by glacial deposits comprising of sandy CLAY, gravelly SAND and sandy GRAVEL. Subsoil thickness ranges from 1.3 – 16.3m and averaging 7.41m within the Northern Cluster, while ranging between 1.3 – 30m and averaging 7.32m in the Southern Cluster. These deposits are stable and are capable of supporting wind turbine base foundations.

The bedrock underlying the proposed Wind Farm site was observed in over 680m of borehole drilling. The limestone bedrock is typically strong and competent. Karst features are not common in this area with only very isolated sections of weathered limestone encountered during the site investigation works.

Ground bearing foundations will be utilised at all 20 no. turbines due to the good ground conditions encountered during the comprehensive site investigation works.

Excavation of mineral subsoils and bedrock will be required for site levelling, infrastructure and foundations for the access roads and turbines. Estimated volumes of subsoils/bedrock to be removed at the 20 no. turbine foundations, hardstandings and along access roads is 126,500m^3. The handling and storage of spoil will be done in accordance with the Spoil Management Plan, with most of the spoil (59,600m^3) generated during construction to be reused or reinstated across the development. Excess spoil (66,900m^3) will be transferred to carefully selected permanent spoil storage areas.

Storage and handling of hydrocarbons/chemicals will be carried out using best practice methods. Measures to prevent peat and subsoil erosion during excavation, reinstatement and long-term storage of peat will be undertaken to prevent erosion and potential water quality impacts.

An assessment of the construction stage, operational stage and decommissioning stage has been completed. Based on the above, and with implementation of the outlined mitigation measures, no likely significant effects on the soils and geology environment are predicted to occur.

Our assessment confirms there will be no cumulative effects on land soil and geology environment as a result of the Proposed Development.

1.9 Hydrology and Hydrogeology

The Proposed Development is located just east and south of the village of Dysart, Co. Roscommon and ~12km west of Athlone, Co. Westmeath. There are two areas of Proposed Development, the Northern Cluster (7 no. turbines), and the Southern Cluster of wind turbines (13 no. turbines). It is proposed to construct a 110 kV substation within the Southern Cluster and to connect from here via a 110 kV underground cable connection to the existing Athlone 110 kV substation in Monksland, located approximately 11.3km to the east of the Southern Cluster, via underground cabling.

On a regional scale, the Proposed Development is located within the Upper Shannon (26D) catchment, with a small section to the southeast of the Wind Farm Site within the Upper Shannon (26G) catchment, all within Hydrometric Area 26 (Upper Shannon) of the Irish River Basin District. On a more local scale, the proposed Wind Farm Site (Northern and Southern Clusters) is broadly contained within the River Suck sub-catchment (Suck_SC_090), with a small section of the Southern Cluster (T19 & T20) contained within the Cross River sub-catchment (Shannon [Upper]_SC_100). The grid connection route is mostly located within the Cross River sub-catchment (Shannon [Upper]_SC_100), with a small section close to Athlone is located in the Shannon [Upper]_SC_090 sub-catchment.

A detailed baseline hydrological and hydrogeological investigation of the Proposed Development site has been conducted by HES between 2020-2021 while using historical data dating back to 2010. Numerous instances of borehole drilling and trial pitting have been undertaken to determine the soils, subsoils and bedrock. Approximately 3.6km of Geophysics lines have been completed to correlate with the intrusive site investigation data. Due to the sensitive nature of the water environment near the Proposed Development site, consisting of seasonal turloughs, some of which are designated as European Sites (SACs and SPAs), a detailed investigation of the groundwater levels, flow directions, hydrochemistry has been completed as well as an assessment of groundwater strikes within boreholes and the general extent of karstification within the underlying bedrock.

Following these site investigation phases (2010-2011, 2015, 2019-2021), the large dataset of geological and hydrogeological information was analysed and synthesised to form a conceptual model of groundwater flow within the Proposed Development site and extending to the broader local area which includes the surrounding turloughs. This included analysis of water levels from local and regional turloughs, numerous groundwater wells, EPA and GSI water monitoring sites, and rainfall data collected at the proposed Wind Farm Site. These data and hydrogeological understanding were used to develop a conceptual site model (CSM) (Note: CSM is a standard descriptor in hydrogeology). The CSM for the Wind Farm site is founded on detailed hydrogeological information and is factual and not conceptual as inferred by the standard terminology) of groundwater levels, gradients and flow directions has been used to inform the impact assessment process.

The turloughs surrounding the Proposed Development (Wind Farm site and Grid Connection route) occur at higher and lower elevations within the landscape. The turloughs are situated at ~55-65 m OD and are approximately 3-4km from the River Suck, which has a typical water level of 40-42 m OD. This relative elevation difference creates a reasonably high hydraulic gradient over that 3-4 km distance. At the Wind Farm site groundwater levels are observed to rise gradually in Autumn-Winter (in response to accumulations of rainfall depth), and in certain locations rising groundwater emerge above ground to form open water flooded areas (called turloughs: Gortaphuill, Commons, Thomas Street, Lough Croan, Four Roads, Feacle Turlough, Ballyglass Corkip Lough etc), and groundwater levels remain high from January to April, and then groundwater levels slowly recede until the turloughs disappear in May/June, and the regional groundwater levels are fully below ground again.

Although there is a significant driving groundwater gradient with high groundwater levels of >65 m OD just 3-4km from surface waters at ~40-42 m OD, the groundwater within the system does not readily discharge/flow to these surface waters (there is no free-flowing underlying karst drainage network). Instead, the groundwater levels build up (over winter) and groundwater floods the land surface (at high elevations) at known turloughs and loughs. While there are some mapped tracer connections within the

underlying bedrock system (i.e., Feacle Turlough to Killeglan Spring), in general, there has to be bulk resistance to groundwater flow, otherwise observed groundwater gradients and indeed Winter water levels would be much lower/flatter.

The proposed Wind Farm site and Grid Connection works involve excavation of soil and subsoils and bedrock, and creation of access tracks, and turbine foundations. Excavations and earthworks are also required at the substation and along the proposed Grid Connection route, although the latter is temporary and transient and will be reinstated relative quickly. There is a risk that these proposed excavation works can potentially alter the recharge mechanisms that feed the groundwater system below the Wind Farm site and also potentially alter the water quality within the groundwater systems below the Wind Farm and Grid Connection route. Such occurrences could impact on local groundwater quality, groundwater wells, and also on downgradient water dependent ecological receptors such as turloughs and river systems.

During each phase of the Proposed Development (construction and operation/maintenance) a number of activities will take place on the site of the Proposed Development, some of which will have the potential to affect the hydrological regime or water quality at the site or its vicinity. These significant potential impacts generally arise from sediment input from drainage water and other pollutants such as hydrocarbons and cement-based compounds, with the former two having the most potential for impact, given the underlying hydrological regime (indirect recharge to groundwater – and no direct surface water runoff/discharges).

A key design criterion for the Wind Farm site is to avoid potential karst anomalies or weathered bedrock at proposed turbine locations. This has been achieved with the proposed layout as iterative site investigation works have been completed (drilling and geophysical surveys). In addition, the detailed site investigation works that have been completed demonstrate that there is a significant cover of soil and subsoil over bedrock across both of the proposed Wind Farm site clusters. This means there is a natural protection to the underlying bedrock aquifer in the form of that soils/subsoil cover. The perception of this area of Roscommon is that is significantly karstified and limestone boulders observed in fields are representative of should bedrock and extreme groundwater vulnerability. This is proven not to be the case.

All proposed wind farm infrastructure will be installed above recorded groundwater levels, therefore there is no potential for wind farm infrastructure to block or alter underlying groundwater flow regimes.

Drainage measures, pollution control and other preventative measures have been incorporated into the project design (Wind Farm site and Grid Connection route works) to minimise significant negative impacts on groundwater quality and downstream designated sites.

The surface water drainage plan will be the principal means of significantly reducing sediment in drainage water arising from construction activities and for the control of runoff/recharge. The key drainage water control measure is that there will be no direct discharge of Wind Farm site drainage water without treatment prior to recharge. This will be achieved by design methods outlined in the Drainage Management Plan.

Preventative measures also include controls for fuel and concrete management and a waste management plan which will be incorporated into the Construction and Environmental Management Plan (refer to Appendix 4-9).

Overall, the Proposed Development (Wind Farm site and Grid Connection works) presents no significant impacts to surface water and groundwater quality provided the proposed mitigation measures are implemented.

No significant cumulative impacts on any of the regional surface water catchment or groundwater bodies will occur as a result of the Proposed Development.

1.10 Air and Climate

This chapter identifies, describes and assesses the potential significant direct and indirect effects on air quality and climate arising from the construction, operation and decommissioning of the Proposed Development.

The Environmental Protection Agency (EPA) has designated four Air Quality Zones for Ireland:

- Zone A: Dublin City and environs
- Zone B: Cork City and environs
- Zone C: 16 urban areas with population greater than 15,000
- Zone D: Remainder of the country.

These zones were defined to meet the criteria for air quality monitoring, assessment and management described in the Clean Air for Europe (CAFE) Directive (as amended) and the Fourth Daughter Directive. The site of the Proposed Development lies within Zone D, which represents rural areas located away from large population centres.

Due to the non-industrial nature of the Proposed Development and the general character of the surrounding environment, air quality sampling was deemed to be unnecessary for this EIAR.

The production of energy from wind turbines has no direct emissions as is expected from fossil fuel-based power stations. Harnessing more energy by means of wind farms will reduce dependency on fossil fuels, thereby resulting in a reduction in harmful emissions that can be damaging to human health and the environment. Some minor short term or temporary indirect emissions associated with the construction of the wind farm include vehicular and dust emissions.

A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-3 of the EIAR) and includes dust suppression measures. In addition, turbines and construction materials will be transported to the site on specified haul routes only. The agreed haul route roads adjacent to the site will be regularly inspected for cleanliness and cleaned as necessary.

Climate Change and Carbon Balance Calculations

Climate change is one of the most challenging global issues facing us today and is primarily the result of increased levels of greenhouse gases in the atmosphere. These greenhouse gases come primarily from the combustion of fossil fuels in energy use. Changing climate patterns are linked to increased frequency of extreme weather conditions such as storms, floods and droughts. In addition, warmer weather trends can place pressure on animals and plants that cannot adapt to a rapidly changing environment. Moving away from our reliance on coal, oil and other fossil fuel-driven power plants is essential to reduce emissions of greenhouse gases and combat climate change.

In June 2022, the Environment Protection Agency released 'Ireland's Greenhouse Gas Emissions Projections 2020-2040'. The EPA projections show that currently implemented measures (With Existing Measures) will achieve a reduction of 5% on 2005 levels by 2030, significantly short of the 30% reduction target. If measures in the higher ambition (With Additional Measures) scenario are implemented, the 30% reduction target by 2030 can be achieved. In the With Additional Measures scenario, it is assumed that by 2030 renewable energy generation increases to approximately 80%of electricity consumption. However, increased coal use from 2021 and growing energy demand, including from data centres, threaten to negatively impact preferred scenario.

The Proposed Development will have an export capacity of approximately 120MW and therefore will help contribute towards this target. As well as this, it will provide much needed grid infrastructure, and the capacity to offset 4,819,016 tonnes of CO_2 in its operational lifetime thereby reducing the

Greenhouse Gas effect and improving air quality as we transition to cleaner energy industries. Please see Section 10.2.4 for details on Carbon offset calculations.

A methodology for calculation carbon losses was published in June 2008 by scientists at the University of Aberdeen and the Macauley Institute with support from the Rural and Environment Research and Analysis Directorate of the Scottish Government, Science Policy and Co-ordination Division. This methodology was refined and updated in 2011 based on feedback from users of the initial methodology and further research in the area. The web-based version of the carbon calculator, which supersedes the excel based versions of the tool, was released in 2016. The tool provides a transparent and easy to follow method for estimating the impacts of wind farms on the carbon dynamics of peatlands and was used to assess the effects of the proposed wind farm in terms of potential carbon losses and savings taking into account peat removal, drainage and operation of wind farm. The model calculates the total carbon emissions associated with the proposed wind farm development including manufacturing of the turbine technology, transport, construction of the development and carbon losses due to peatland disturbance. The model also calculates the carbon savings associated with the proposed wind farm development. Previously guidance produced by Scottish Natural Heritage in 2003 had been widely employed to determine carbon payback in the absence of any more detailed methods.

Given the absence of peat underlying the site, the Proposed Development will not give rise to any impact on peat habitat. The Macauley Institute methodology states that the total volume of peat impacted by the construction of the wind farm is strongly correlated to the extent of the peatland affected by drainage at the site. Therefore, in calculating the carbon loss/saving of the Proposed Development, all potential carbon losses associated with constructing a wind farm on peatland environments were discounted, but the carbon losses as a result of the manufacture, transportation and erection of the proposed turbines was included in the calculation, including as a result of the removal of vegetation.

Clear-felling of existing forestry surrounding turbine locations is often necessary on wind farm sites to avoid reductions in the wind energy yield of wind farm proposals. However, given the absence of forestry on the Proposed Development site, all potential carbon losses associated with felling forestry within a wind farm were also discounted from the carbon loss calculations.

Construction of the Proposed Development will have a Short-Term, Imperceptible Negative Effect as a result of greenhouse gas emissions from construction plant and vehicles. Operation of the Proposed Development will have a Direct Long-Term Moderate Positive Impact on climate as a result of reduced greenhouse gas emissions.

1.11 Noise and Vibration

AWN Consulting Limited has been commissioned to conduct an assessment into the likely environmental noise and vibration impacts of the proposed Seven Hills wind farm development (the 'Proposed Development').

The background noise environment has been established through noise monitoring surveys undertaken at several noise-sensitive locations (NSLs) surrounding the Proposed Development. Typical background noise levels for day and night periods at various wind speeds have been measured in accordance with guidance contained ISO 1996: 2017 *Acoustics – Description, Measurement and Assessment of Environmental Noise*. Prevailing noise levels are primarily attributable to traffic in the surrounding area, distant construction activity and a degree of industrial noise from existing facilities.

When considering a development of this nature, the potential noise and vibration effects on the surroundings must be considered for two stages: the short-term construction phase during which noise is generated by the construction machinery and plant, and the long-term operational phase, where no noise is generated by the underground cable.

The assessment of construction noise and vibration and has been conducted in accordance with best practice guidance contained in BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Noise* and BS 5228-2:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Vibration*. Subject to good working practice as recommended in the EIAR Chapter, it is not expected that there will be any significant noise and vibration impacts associated with the construction phase and the likely noise from construction activity at the nearest Noise Sensitive Locations (NSLs) is expected to be well below recommended significance threshold values. The associated construction noise and vibration impacts are not expected to cause any significant effects.

In summary, the noise and vibration impact of the Proposed Development is not significant.

1.12 Landscape and Visual

This chapter addresses the potential landscape and visual impacts of the Seven Hills Wind Farm. The emphasis in this chapter is on the likely significant effects of the Proposed Development, including the grid connection. It covers the assessment methodology, a description of the Proposed Development and the existing landscape based on relevant guidance. It includes a description of the landscape policy of Roscommon with specific reference to wind energy and the study area in which the Proposed Development site is located. The chapter also gives consideration to the landscape and wind energy policies of Counties Galway, Longford, Westmeath and Offaly where some visibility of the Proposed Development may occur.

Siting of the Proposed Development on the subject lands was plan lead. Selection of the site considered landscape and visual designations in the previous and recently adopted Roscommon County Development Plan(s). In this regard, the Proposed Development is predominantly sited in a landscape 'Most Favoured' for wind energy potential in Co. Roscommon and within a Landscape Character Area (LCA 34 - Lough Funshinagh, Stone Wall Grasslands and Esker Ridges) of the lowest value rating in Co. Roscommon. Strategic siting of the turbines within LCA 34 ensured that the Proposed Development will not be the specific object or focus of any designated scenic routes or scenic views in Co. Roscommon. In terms of location, spatial extent, spacing and layout, the siting and design of the Proposed Development adheres to the guidance for the siting of wind farms in Hilly and Flat Farmland Landscape Types, as set out in The Wind Energy Development Guidelines for Planning Authorities (DoEHLG, 2006), & (DoPHLG, 2019)

ZTV mapping indicates high visual exposure of the wind farm throughout the LVIA Study Area, excepting large areas to the north-east where the Proposed Development will be screened from view by elevated landform around the Skrine uplands. Visibility appraisals conducted during many field surveys in 2020 and 2021 determined that actual visibility in the LVIA Study Area is likely to be far less than is indicated by the ZTV mapping. On-site surveys found that visibility of the Proposed Development is predominantly concentrated to areas immediately surrounding the site to a distance of approximately 5 km. Beyond 5 km from the Proposed Development, visibility of the proposed turbines is likely to be very limited where disproportionate screening effect occurs within the flat vegetated landscapes surrounding the Suck and Shannon Valleys to the east, south and west of the Proposed Development. Beyond 5km, visibility of the Proposed Development will occur from elevated vantage points where there are open views across the landscape.

Visibility of the Proposed Development is most likely to occur within the rolling agricultural grasslands immediately surrounding both the northern and southern turbine cluster. Field boundaries in the area are delineated by dry stone walls, low hedgerows and treelines which generally afford lesser screening than the denser mature vegetation existent in the low-lying landscape beyond 5km. No designated scenic amenity is located within this area of high visibility surrounding the site; however, it is a settled landscape and there are residential receptors and local population centres which will have open views of the Proposed Development.

The landscape of the development site is a modified agricultural landscape. The rolling green fields and dry-stone walls give the site and wider landscape setting a distinct visual aesthetic, which is of local importance and heritage value. The karst geology and calcareous grassland habitats are also valuable receptors existent on site. Considering the landscape designations in the Roscommon County Development Plan, the susceptibility of the landscape to wind farm development is low. On balance the Proposed Development site is a landscape deemed to be of medium sensitivity. The introduction of vertical man-made structures and ancillary infrastructure will substantially alter 29.3 hectares of the landscape comprising the proposed infrastructure footprint. The direct effects upon the landscape will be highly localised. The Proposed Development is likely to cause (reversible) long-term landscape effects of Moderate significance at the site of the Proposed Development. Strategic siting of the Proposed Development infrastructure serves to minimise and mitigate impacts upon valuable and sensitive landscape receptors on the site through avoidance of valuable habitats, karst glacial features and old stone walls and monuments of heritage value.

In terms of landscape character, only LCA 34 - Lough Funshinagh, Stone Wall Grasslands and Esker Ridges, in which the proposed turbines are located will experience direct effects on landscape character as a result of the Proposed Development. LCA 34 comprises a landscape of approximately 139 km^2, the footprint of turbines and associated infrastructure of the Proposed Development will only materially alter a very small portion (approximately 0.3 km^2) of the landscape in this LCA (0.2%), therefore direct effects upon the landscape as a resource are very localised. The proposed turbines are likely to be most visible from most areas within this LCA and will cause a Moderate change the visual and perceptual aesthetic of the LCA due to the addition of new uncharacteristic features (turbines) but will not redefine the character of the LCA. A majority of the Proposed Development is sited in an area designated as 'Most Favoured' for wind energy potential and LCA 34 is a landscape designated as one of the lowest value in The Landscape Character Assessment of County Roscommon. In light of these designations, sensitivity of this landscape to this form of development was deemed to be Low. The effects on the character of this LCA are deemed to be of 'Slight' significance. Siting of the proposed turbines in this landscape therefore aligns with local planning of the area.

All other LCAs with potential visibility of the Proposed Development within 15km were comprehensively assessed in Appendix 12-2 accompanying this chapter. The Proposed Development is often visible from within these landscapes but located at some distance outside of them. Therefore, effects on landscape character from these LCAs are of a perceptual and aesthetic nature and the proposed turbines will not materially alter these landscape receptors and likely effects upon landscape character were not deemed to be significant.

The visual assessment was conducted using 18 Photomontage viewpoints representative of prominent visual receptors surrounding the Proposed Development whilst demonstrating views of the proposed turbines from a variation of geographical perspectives and distances. The assessment concluded that 'Significant' residual visual effects occurred at two of the 18 viewpoint locations. These significant visual effects are attributed to substantial change occurring from residential receptors of high sensitivity that are located in relatively close proximity to the Proposed Development site. However, the siting of proposed turbines adheres to the minimum 500 metre set back distance in the current Wind Energy Development Guidelines (2006, DoEHLG) and also the 4 times tip height set-back distance explicitly set out for residential visual amenity prescribed by the Draft Revised Wind Energy Development Guidelines (2019, DoHPLG).

Residual visual effects of 'Moderate' significance occurred at five of the 18 No. viewpoints. All other viewpoints were assessed as resulting in 'Slight' significance (7) or 'Not Significant' (6). All residual visual effects of 'Moderate' significance occurred within close proximity (7km) to the Proposed Development where most visibility is likely to occur. Visual effects were also assessed from designated scenic amenity and highly sensitive receptors in Counties Roscommon, Longford, Galway, Offaly and Westmeath. Residual visual effects were deemed to be of 'Slight' significance when the turbines were seen within highly sensitive views (views across Lough Ree from Ballykeeran) and from highly sensitivity receptors (Clonmacnoise), in such instances, visual effects are significantly mitigated by distance.

All other existing, permitted and proposed turbines have a substantial set back distance (> 8.5 km) from the proposed turbines. Combined visibility (simultaneous and successional) visibility of the other turbines and the Proposed Development occurs from a few limited perspectives. In this regard, cumulative landscape and visual effects with other wind farms are not significant.

The greatest adverse cumulative visual effects are likely to occur on account of the visual relationship between the two proposed turbine clusters. Assessments conducted in this LVIA determined that the impact of viewing both the northern and Southern Cluster in opposite directions (combined successional cumulative effects) does cause some minor cumulative visual effects but does not cause a surrounding effect. As seen throughout the photomontage booklet, in most instances where there is a high potential for significant visual effects (e.g., sensitive receptors in close proximity to the Proposed Development), only one turbine cluster is visible, particularly from receptors to the south of the northern turbine cluster. Sequential cumulative effects will occur along the regional roads (R357 and R363) in close proximity to the site, however, these are not routes of high sensitivity and cumulative effects are not deemed to be significant.

1.13 Archaeology and Cultural Heritage

This chapter comprises an Environmental Impact Assessment Report (EIAR) of the potential impact of the proposed Seven Hills wind farm development on the Cultural Heritage resource. Cultural heritage includes archaeology, architectural heritage and any other tangible assets. The assessment was based on Geographic Information System-based mapping, ZTV and Viewshed analysis to assist with the assessment of impacts on setting. Desktop analysis of all baseline data and a comprehensive programme of field inspection of the EIAR site boundary also took place.

The results of the assessment, in relation to construction, operation and decommissioning of the Proposed Development, have been set out in the foregoing sections. This assessment has concluded that the construction phase will have at worst a permanent, direct and moderate effect on the archaeological, architectural, cultural and protected heritage resource. The operational phase will have a long-term, reversible and from imperceptible to significant effect on the archaeological, architectural, cultural and protected heritage resource.

Construction Phase

Direct Effects on Recorded Monuments within the EIAR Site Boundary

There are 38 Recorded Monuments located within the EIAR Site Boundary. Of these 38 Recorded Monuments, eight are located within the footprint of the Proposed Development. Of these eight Recorded Monuments, six take the form of field systems, while there is also a wall (linear earthwork-wall) and a road/trackway. The direct construction impacts on these eight Recorded Monuments will be mitigated by licensed test trenching, monitoring, buffer zones agreed with National Monuments Service, the creation of pre-construction written and photographic records and compliance with regulatory requirements.

Direct Effects on Sub-surface Archaeological Remains

Due to the number of above-ground archaeological monuments recorded within the surrounding landscape of the EIAR Site Boundary, the potential for the Proposed Development area to contain previously unrecorded sub-surface archaeological features and artefacts is considered to be medium to high. Potential direct construction impacts on any previously unrecorded sub-surface archaeological remains that may exist within the Proposed Development will be mitigated by licensed test trenching and monitoring and compliance with regulatory requirements.

Direct Effects on Protected Structures, NIAH Sites and other Cultural Heritage Features within the EIAR Site Boundary

There are no built heritage structures which have statutory protection or otherwise within the EIAR Site Boundary. A number of stone walls which do not receive statutory protection under the National Monuments Acts (as amended) are located within the proposed site. The direct construction impact on these walls will be mitigated by the creation of pre-construction written and photographic records and licensed monitoring and compliance with regulatory requirements.

Direct Effects on Townland, Parish and Barony Boundaries

The proposed access roads will cross 18 townland boundaries, six parish boundaries and one barony boundary. The direct construction impacts on any surviving boundaries will be mitigated by the creation of pre-construction written and photographic records and licensed monitoring and compliance with regulatory requirements.

Direct Effects on Recorded Monuments, Protected Structures, NIAH Sites along the proposed Grid Connection route

There are no Recorded Monuments, Protected Structures, structures recorded on the National Inventory of Architectural Heritage, historic gardens or designed landscapes recorded on the National Inventory of Architectural Heritage, or any additional statutorily protected archaeological, architectural, cultural or protected heritage features within the line of the proposed Grid Connection.

There are three Recorded Monuments within 100m either side of the proposed Grid Connection. There is one Protected Structure within 100m either side of the proposed Grid Connection. There are no structures recorded on the National Inventory of Architectural Heritage within 100m either side of the proposed Grid Connection. There are no historic gardens or designed landscapes recorded on the National Inventory of Architectural Heritage within 100m either side of the proposed Grid Connection.

The construction phase of the proposed Grid Connection will not have any direct impact on recorded archaeological, architectural, cultural or protected heritage features, and as a result there will be no impacts.

Direct Effects on Recorded Monuments, Protected Structures, NIAH Sites along the proposed turbine delivery route

Turbine delivery will require minor temporary modifications in a number of places along the route which includes the removal of road signs, lamp posts, bollards, etc.

There are no archaeological, architectural, cultural or protected heritage features within any areas identified as requiring Major Amendments. Major Amendments are defined in the turbine delivery Route Access Survey as areas where third party land or road widening will be required. No other amendments in the turbine delivery Route Access Survey will require road widening or ground disturbance, and therefore only those areas requiring Major Amendments have been assessed in this chapter.

There are no Recorded Monuments within 100m of areas identified as requiring Major Amendments. There are no Protected Structures within 100m of areas identified as requiring Major Amendments. There are no structures recorded on the National Inventory of Architectural Heritage within 100m of areas identified as requiring Major Amendments.

The proposed turbine delivery route will not require groundworks or road widening in any areas of archaeological, architectural, cultural or protected heritage potential, and as a result there will be no impacts.

Operational Phase

Effects on Setting of World Heritage Sites and Sites included in the Tentative List as consideration for nomination to the World Heritage List

There are no World Heritage Sites within 20km of the EIAR Site Boundary.

There is one site (Clonmacnoise) included in the Tentative List as consideration for nomination to the World Heritage List within 20km of the EIAR Site Boundary. The Proposed Development will have a long-term, reversible and slight operational phase negative visual impact on the setting of Clonmacnoise.

Effects on Setting of National Monuments in State Care

There are five National Monuments (at three sites) within 10km of the EIAR Site Boundary.

It is assessed the Proposed Development will have a long-term, reversible and slight operational phase negative visual impact on the setting of National Monument Number 467 (holy well and crucifixion plaque).

It is assessed the Proposed Development will have a long-term, reversible and slight operational phase negative visual impact on the setting of National Monument Number 487 (ringfort).

It is assessed the Proposed Development will have a long-term, reversible and moderate operational phase negative visual impact on the setting of National Monument Number 682 (motte and bailey and unclassified castle).

Effects on Setting of Recorded Monuments within the EIAR Site Boundary.

There are 38 Recorded Monuments within the EIAR Site Boundary. It is assessed the Proposed Development will have a long-term, reversible and significant operational phase negative visual impact on the setting of Recorded Monuments located within the EIAR Site Boundary.

Effects on Setting of Recorded Monuments within 1km of the EIAR Site Boundary

There are 129 Recorded Monuments within 1km of the EIAR Site Boundary. It is assessed the Proposed Development will have a long-term, reversible and moderate operational phase negative visual impact on the setting of Recorded Monuments located within 1km of the EIAR Site Boundary.

Effects on Setting of Protected Structures, Conservations Areas, NIAH Sites within the EIAR Site Boundary

There are no Protected Structures, Conservation Areas or Proposed Conservation Areas, structures recorded on the National Inventory of Architectural Heritage or historic gardens, or designed landscapes recorded on the National Inventory of Architectural Heritage within the EIAR Site Boundary. As there are no Protected Structures, Conservation Areas or Proposed Conservation Areas, NIAH sites or historic gardens or designed landscapes within the EIAR Site Boundary, there will be no operational phase visual impacts.

Effects on Setting of Protected Structures, Conservations Areas, NIAH Sites within 5km of the EIAR Site Boundary and historic gardens within 1km of the EIAR Site Boundary

There are 19 Protected Structures, no Conservation Areas or Proposed Conservation Areas, and five structures recorded on the National Inventory of Architectural Heritage within 5km of the EIAR Site Boundary. There are two historic gardens or designed landscapes recorded on the National Inventory of Architectural Heritage within 1km of the EIAR Site Boundary. It is assessed the Proposed

Development will have a long-term, reversible and slight operational phase negative visual impact on the setting of Protected Structures and NIAH sites within 5km of the EIAR Site Boundary and historic gardens or designed landscapes within 1km of the EIAR Site Boundary.

Effects on Setting of Local Built Heritage

No new-above ground archaeological features (i.e., pre 1700 AD) were noted within the footprint of the Proposed Development. A number of stone walls which are not protected under the National Monuments Acts (as amended) are located within the Proposed Development. It is assessed the Proposed Development will have a long-term, reversible and not significant operational phase negative visual impact on the setting of the non-protected stone walls.

Recorded Monuments, Protected Structures, NIAH Sites along the proposed Grid Connection

There are no Recorded Monuments, Protected Structures, structures recorded on the National Inventory of Architectural Heritage, historic gardens or designed landscapes recorded on the National Inventory of Architectural Heritage, or any additional statutorily protected archaeological, architectural, cultural or protected heritage features within the line of the proposed grid connection. As such, there will be no direct construction impacts on any recorded archaeological, architectural, cultural or protected heritage features.

There are three Recorded Monuments within 100m either side of the proposed Grid Connection. There is one Protected Structure within 100m either side of the proposed Grid Connection. There are no structures recorded on the National Inventory of Architectural Heritage within 100m either side of the proposed Grid Connection. There are no historic gardens or designed landscapes recorded on the National Inventory of Architectural Heritage within 100m either side of the proposed Grid Connection.

As the proposed Grid Connection will be entirely underground, there will be no operational phase visual impacts.

Recorded Monuments, Protected Structures, NIAH Sites along the proposed turbine delivery route

Turbine delivery will require minor temporary modifications in a number of places along the route, including the removal of road signs, lamp posts, bollards, *etc.*

There are no archaeological, architectural, cultural or protected heritage features within any areas identified as requiring Major Amendments. Major Amendments are defined in the turbine delivery Route Access Survey as areas where third party land or road widening will be required. No other amendments in the turbine delivery Route Access Survey will require road widening or ground disturbance, and therefore only those areas requiring Major Amendments have been assessed in this chapter.

There are no Recorded Monuments within 100m of areas identified as requiring Major Amendments. There are no Protected Structures within 100m of areas identified as requiring Major Amendments. There are no structures recorded on the National Inventory of Architectural Heritage within 100m of areas identified as requiring Major Amendments.

The proposed turbine delivery route will not require groundworks or road widening in any areas of archaeological, architectural, cultural or protected heritage potential, and as a result there will be no operational phase visual impacts.

Cumulative Effects (Construction Phase)

It is assessed that there is no likelihood for the Proposed Development to result in cumulative effects on archaeological, architectural, cultural or protected heritage during the construction phase of the development.

Since potential direct impacts on the archaeological, architectural and cultural and protected heritage resource have been assessed and mitigated, cumulative direct impacts will not occur at the construction stage of the Proposed Development.

In terms of construction phase cumulative impacts with other existing, permitted or Proposed Developments, including three no. wind farms and an existing quarry, it is assessed that there are no developments which could act in combination with the Proposed Development to result in direct or indirect construction phase effects.

Cumulative Effects (Operational Phase)

There are only two existing turbines (Skrine Wind Farm) located within 10km of the Proposed Development, and these have a tip height of 100m and are located 8.5km north of Turbine 1. Derrane Wind Farm consists of two permitted turbines, which are located 20km north of Turbine 1. Kilcash Wind Farm consists of one proposed turbine, which is located 10.3km northeast of Turbine 1 and Turbine 2.

National Monument Number 487 (ringfort) is located approximately 9.5km from the proposed location of Kilcash Wind Farm (one proposed turbine) and is the only National Monument within 10km of the three above-mentioned wind farms. Kilcash Wind Farm is located 10.3km northeast of Turbine 1 and 2 and is therefore outside the 10km study area used for the assessment of operational phase visual impacts on National Monuments. Skrine is the only wind farm (two existing turbines) within 10km of the Proposed Development, but it is located approximately 10.7km from National Monument Number 487. There are no National Monuments therefore within 10km of both the Proposed Development and any of the three wind farms. As such, the three wind farms have been screened out for operational phase Cumulative Effects on National Monuments.

Given the distance of Skrine Wind Farm, Derrane Wind Farm and Kilcash Wind Farm from the Proposed Development, along with the extent of existing screening over such intervening distances, the three wind farms (five no. turbines in total) have been screened out for operational phase Cumulative Effects on archaeological, architectural, cultural or protected heritage features.

Decommissioning Phase

It is assessed that there will be no likely decommissioning phase impacts on the archaeological, architectural, cultural or protected heritage resource. The decommissioning phase will involve removal of wind farm infrastructure from the site. Once the wind turbines have been dismantled and removed, the below-ground turbine foundations will be left *in situ* and covered with topsoil. This naturalisation process will revert the landscape of the Proposed Development to a condition similar to the current landscape baseline. The decommissioning phase will also result in an improvement in the archaeological, architectural, cultural and protected heritage resource as all operational phase visual impacts will be entirely removed through decommissioning of the turbines.

1.14 Material Assets

1.15 Roads, Traffic, Transport & Access

The EIAR provides a detailed description of the haul route to be followed from the chosen port facility to the subject site, including the traffic management and improvement works required along the road network and at junctions and roundabouts. It also details the breakdown and schedule of the number and size of vehicles associated with the construction, operation and decommissioning phases of the development. The effect of increased construction traffic on the local road network has also been assessed.

This assessment used the following methods: -

- Legislation and guidance review;
- Desk study, including review of available maps and published information;
- Site walkover, including review of road network to be used;
- Evaluation of likely effects;
- Evaluation of the significance of these effects; and
- Identification of measures to avoid and mitigate any likely effects.

A number of oversized loads will be required to carry the long blades, towers and turbine components to the site and will necessitate temporary accommodation works at a number of locations between the M6 and the proposed site entrances. Permanent upgrade works will be undertaken along the L7535 local road between its junction with the R363 and the proposed wind farm site entrance. The permanent works will comprise the widening of the L7535 carriageway to approximately 5m over a distance of approximately 415m.

It is assessed that, during the construction phase, there will be a temporary increase in traffic flows on the local road network due to vehicles carrying turbine components and construction materials. Over the course of the construction phase, it is assessed that the average daily increase in HGV traffic volumes arising from the wind farm will be 53 no. per day.

During the construction of the proposed grid connection, minor disruption will be experienced by road users. Due to the characteristics of the roads involved, it is likely that 'single-lane closures' combined with a 'Stop/Go' system will be implemented which will allow for construction activities to progress in a safe manner while ensuring public safety and that existing traffic flows are maintained. Following the completion of grid connection works, the route will be reinstated to the satisfaction of the Local Authority.

Following the completion of construction, traffic entering the site will be substantially reduced, with maintenance vehicles (1-2 no. per week) visiting the site only intermittently.

A series of mitigation measures have been proposed to reduce the level of likely impact associated with the Proposed Development. The Proposed Development has generally been assessed as having likely, negative, slight/moderate and short-term effects. Following the implementation of mitigation measures, the likely final effects have been assessed as imperceptible/slight, negative and short-term in nature. In addition, there will also be a likely positive residual effect from permanent upgrade of the L7535.

Overall, it has been identified that there is no likelihood of significant effects which could arise as a result of the construction, operation or decommissioning of the Proposed Development either individually or in combination with other existing, permitted or Proposed Developments.

1.15.1 Aviation

This section assesses the likelihood of effects on aviation arising from the construction, operation or decommissioning of the Proposed Development.

The assessment involved consultation with various stakeholders including the Irish Aviation Authority (IAA) and Department of Defence. In addition, publications issued by the IAA and the Department were reviewed to determine if the Proposed Development site was assessed as being of significance or if significant effects were likely. A desktop study was also undertaken to determine the presence of aerodromes or airstrips within 20km of the subject site.

This assessment has also had regard to the *Draft Air Corps Wind Farm/Tall Structures Position Paper (August 2014)* which sets out the Air Corps position on the appropriate siting and management of wind farms and tall structures. This assessment includes a detailed review of this position paper, a

comparison of the Proposed Development site with identified 'Danger Areas', 'Restricted Areas' and 'Low Level Flying Areas'.

Due to the general 'low altitude' of activity during the construction phase, it is assessed that there will be no likely impact on aviation. During the erection of wind turbines, cranes will be fitted with appropriate aviation warning lighting to alert pilots to the presence of tall structures.

Following the completion of the construction phase, no significant effects are assessed as likely to occur. The installation of aviation warning lighting is inherent to the project design; and its operation during the operational phase will ensure that any civil and military aviation activities occurring then the vicinity of the Proposed Development are sufficiently aware of the presence of the Proposed Development.

The Proposed Development site is not located within any low flying areas, restricted areas, danger areas, military operating areas or low-level routes identified within the *Draft Air Corps Wind Farm/Tall Structures Position Paper (August 2014)*.

This assessment concludes that the Proposed Development, including grid connection, is unlikely to result in any significant effect on aviation. The Proposed Development site is not located within an area identified as being of particular sensitivity or importance in the *Draft Air Corps Wind Farm/Tall Structures Position Paper (August 2014)* for military aviation or located close to any civilian aerodrome, airfield or airport. Accordingly, with the installation of appropriate aviation warning lighting, no significant effects are assessed as likely to occur.

Overall, it is assessed that significant effects on aviation are unlikely to arise as a result of the Proposed Development, either individually or in combination with other existing, permitted or Proposed Developments.

1.15.2 Telecommunications

This section considers the likely effects of the Proposed Development upon a range of communications infrastructure, including telecommunication networks, broadcast radio and television and fixed infrastructure such as telecommunication masts.

The methodology followed to assess the likelihood of significant effects on telecommunication networks consisted of desk-based research and consultation with various telecommunication companies and relevant authorities.

During consultation with various stakeholders and service providers, a number of telecommunication links were identified either traversing the Proposed Development site or in its immediate vicinity. In particular, the Applicant was advised of the likelihood of interference on the services Eir, Imagine Group, Ripplecom, 2rn, Three Ireland, Vodafone Ireland, and Lighthouse Networks Limited/Lightnet. Subsequent to further detailed consultation, the layout of the Proposed Development was revised to ensure the provision of appropriate buffer zones around each telecommunications link likely to be affected.

Accordingly, he Proposed Development is not likely to result in any effects on telecommunications.

Notwithstanding the above, provision has been made for the appropriate reporting, recording, and remediating of any interference complaints which may be received. Additionally, the Applicant entered into a protocol arrangement with 2rn for the appropriate remediation of any interference with the 2rn network.

Overall, it is concluded that, on the basis of a desktop assessment and extensive consultation with stakeholders, the Proposed Development will not result in likely significant effects on the telecommunications network.

Resources & Utility Infrastructure

This section provides details of the likelihood of significant effects or interactions with existing renewable and non-renewable resources and existing utility infrastructure; including existing or permitted wind farms, quarries, mining operations and utility infrastructure (electricity lines and phone lines).

The methodology followed in this assessment involved a desk-based study to identify resources and utility infrastructure which could be affected by the Proposed Development followed by an evaluation, based on experience, as to whether these resources were likely to be affected.

The construction phase of the Proposed Development is not likely to have any significant effects on existing resources or utility infrastructure. The construction phase will not restrict the export of energy generated from other sources nor will it impact upon existing utility services. While there is a possibility interaction with utility services (e.g., accidental collision with overhead wires during the construction phase), this can be mitigated through good construction practices.

The construction phase will result in the extraction of non-renewable resources in the form of stone and gravel for the construction of access tracks and concrete for building foundations and electrical equipment plinths. However, stone and gravel will only be sourced from quarries with full planning permission.

The operational phase of the Proposed Development will not result in any effect on existing utility infrastructure or renewable or non-renewable resources. The connection of the Proposed Development to the national grid will strengthen the electricity network infrastructure in the wider region.

No specific mitigation measures are proposed or required during the construction, operational, or decommissioning phases.

This assessment concludes that the Proposed Development is unlikely to result in any significant adverse effect on renewable and non-renewable resources or on utilities infrastructure. The operation of the Proposed Development will bring about a benefit in terms of electricity generated from renewable sources and a strengthening of national electricity grid infrastructure in the wider region of the Proposed Development site. This assessment similarly concludes that the Proposed Development is unlikely to result in any significant adverse cumulative effects in combination with existing, permitted or Proposed Developments.

1.16 Major Accidents and Natural Disasters

This section of the Environmental Impact Assessment Report (EIAR) describes the likely significant effects on the environment arising from the vulnerability of the proposed Seven Hills Wind Farm project (the "Proposed Development") as detailed in Chapter 4 to risks of major accidents and/or natural disasters.

Major accidents or natural disasters are hazards which have the potential to affect the Proposed Development and consequently have potential impacts on the environment. These include accidents during construction and operation caused by operational failure and/or natural hazards. The assessment of the risk of major accidents and/or disaster considers all factors defined in the EIA Directive that have been considered in this EIAR, i.e., population and human health, biodiversity, land, soil (peat stability), water, air and climate and material assets, cultural heritage and the landscape.

A desk-study has been completed to establish the baseline environment for which the proposed risk assessment is being carried out. This will influence both the likelihood and the impact of a major accident or natural disaster. Local and regional context has been established prior to undertaking the

risk assessment to develop an understanding of the vulnerability and resilience of the area to emergency situations. Further detail on the baseline environment is provided in Section 16.3 of this EIAR.

A wind farm is not a recognised source of pollution. It is not subject to Industrial Emissions Directive regulation or any other Environmental Protection Agency environmental regulatory consent. Should a major accident or natural disaster occur the potential sources of pollution onsite during the construction, operational and decommissioning phases are limited and of low environmental risk. Sources of pollution with the potential to cause significant environmental pollution and associated negative effects such as bulk storage of hydrocarbons or chemicals, storage of wastes, management of flammable materials etc. are limited and so there is an inherent low level of environmental risk associated with major accident or natural disaster impacting the Proposed Development and causing environmental damage.

There is low potential for significant natural disasters to occur at the proposed Seven Hills Wind Farm site. Ireland is a geologically stable country with a mild temperate climate. The potential natural disasters that may occur are therefore limited to issues such as flooding and fire. At present, there are no SEVESO Sites within County Roscommon. The risk of a major accident and/or disaster during the construction of the Proposed Development is considered 'low' in accordance with the 'Guide to Risk Assessment in Major Emergency Management' (DoEHLG, 2010).

The scenarios with the highest risk score in terms of the occurrence of major accident and/or disaster was identified as 'Contamination' of the Proposed Development site and risk of 'Industrial Accident-Fire/Gas Explosion' during the construction, operation and decommissioning phases.

These scenarios scored higher than other scenarios on a very precautionary basis. Mitigation measures will be put in place to reduce the risk of accidental spillage and contamination of pollution risk to groundwater, surface water and associated ecosystems, and to terrestrial ecology. Therefore, the risk of contamination is 'very unlikely' to occur and will have 'limited' consequences should it do so, representing a 'low-risk scenario' during the construction and decommissioning phases. The wind farm will be designed, built and operated in line with current best practice. Further, in accordance the Safety, Health and Welfare at Work Acts 2005 to 2014, the Proposed Development shall be subject to a fire safety risk assessment which will assist in the identification of any major risks of fire on site, and mitigation of the same during operation. Therefore, the risk of fire/explosion occurring at the Proposed Development resulting in a major accident and/or disaster is 'very unlikely' to occur and having 'limited' consequences should it do so, representing a 'low-risk scenario' during the operational phase.

The Proposed Development has been designed and built in accordance with the best practice measures set out in this EIAR and, as such, mitigation against the risk of major accidents and/or disasters is embedded through the design.

1.17 Interactions of the Foregoing

Chapters 5 to 14 of this EIAR identify the potential significant environmental effects that may occur in terms of Population and Human Health, Biodiversity, Ornithology, Land, Soils and Geology, Hydrology and Hydrogeology, Air and Climate, Noise and Vibration, Landscape and Visual, Cultural Heritage and Material Assets, as a result of the Proposed Development. All of the potential significant effects of the Proposed Development and the measures proposed to mitigate them have been outlined in the main EIAR. For any development with the potential for significant environmental effects there is also the potential for interaction between these potential significant effects. The result of interactive effects may exacerbate the magnitude of the effects or ameliorate them or have a neutral effect. A matrix is presented in Chapter 15 of the EIAR to identify interactions between the various aspects of the environment already discussed in the EIAR. The matrix highlights the occurrence of potential positive or negative impacts during both the construction and operational phases of the Proposed Development. Where any potential interactive impacts have been identified, appropriate mitigation is included in the relevant sections (Chapters 5–14) of the EIAR.